Annual Report of the
Chief Inspector of Mines
2014

BRITISH COLUMBIA

Ministry of
Energy and Mines

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A Message from the Chief Inspector of Mines

December 21, 2015

I am pleased to present the Annual Report of the Chief Inspector of Mines for the 2014 calendar year. This report is a requirement set out in Section 36 of the Mines Act and is compiled with the assistance of Ministry of Energy and Mines (MEM) staff and contractors.

The year 2014 was a challenging one for MEM and the BC mining industry as a whole in the face of declining commodity prices, mine closures and the Mount Polley mine disaster. On August 4, 2014, public confidence in mining in the province was shaken when a breach occurred at the tailings storage facility at the Mount Polley mine, near the town of Likely. This incident was unprecedented and had far-reaching consequences.

Shortly after the breach, three separate investigations were launched. An independent expert engineering panel was established to determine the root cause of the breach, and my office and the BC Conservation Officer Service (COS) began our own investigations. On August 18, 2014, I ordered mining companies to complete and submit a Dam Safety Inspection for every tailings storage facility at a permitted mine at an accelerated deadline of December 1, 2014.

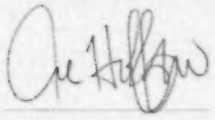
Provincial staff, both my own and others, have worked tirelessly since August 2014 to deal with the Mount Polley breach and aftermath. For MEM, this has included maintaining a presence on the mine site in the weeks following the breach, conducting inspections of the site, providing information to the expert panel and COS investigations as well as the media and co-ordinating our own investigation. I would like to take this opportunity to say thank you to provincial staff for the hard work and dedication they have demonstrated in confronting such a catastrophic event.

The Chief Inspector of Mines is appointed by the Minister of Energy and Mines to administer and enforce the Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia. The Chief Inspector is also the Executive Director of the Health, Safety and Permitting Branch, which operates through a central office in Victoria (which includes the Southwest regional office) and four regional offices in Cranbrook, Kamloops, Prince George and Smithers.

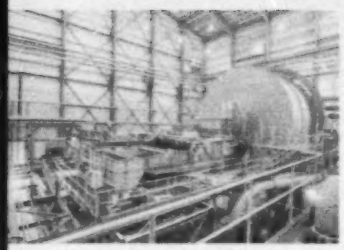
The Office of the Chief Inspector and MEM as a whole works closely with industry, workers and communities to ensure that mineral exploration and mining activities are conducted responsibly. Protection of workers, the public and the environment is always at the top of our minds, and our collective efforts continue to ensure that mining remains one of the safest heavy industries in British Columbia. Injuries at B.C. mines

remained low in 2014, a testament to industry and government's commitment to health and safety in the mining sector.

Sincerely,



Al Hoffman
Chief Inspector of Mines



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1 Principal Functions of the Office of the Chief Inspector and the Health, Safety and Permitting Branch

1.1 Structure and Organization

The Chief Inspector of Mines is the Executive Director of the Health, Safety and Permitting branch of the Mines and Mineral Resources Division of the Ministry of Energy and Mines (MEM). There are two Deputy Chief Inspectors of Mines—one oversees health and safety activities, and the other oversees permitting, reclamation and geotechnical activities. In addition, Regional Directors who report to the Chief Inspector are responsible for overseeing operations in their respective regions.

Health, Safety and Permitting Branch staff are located in Victoria and in regional offices in Cranbrook, Kamloops, Prince George and Smithers.

1.1.1 Mine Rescue Stations

All mine rescue equipment is stored at a centrally located station in Kamloops. This station is supervised by the Inspector of Mines, Health and Safety based in Kamloops, and the Deputy Chief Inspector of Mines, Health and Safety based in in Victoria.

1.2 Mandate & Activities

The primary mandate of MEM's Health, Safety and Permitting Branch is to ensure worker health and safety, public safety and reclamation and protection of the land and watercourses affected by mining and exploration in B.C. The Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia (the Code) specify the legal responsibilities mining companies operating in this province have regarding meeting this mandate, and also protect workers and the public through provisions for minimizing health, safety and environmental risks related to mining activities.

MMRD's Health, Safety and Permitting Branch reviews technical applications, issues permits and performs inspections and audits to ensure compliance with the Mines Act, Code and permit conditions. Branch staff conduct timely and efficient technical reviews and provide expert guidance to industry on the development and operation of mines. The Branch also works closely and collaboratively with other provincial and federal agencies and local governments to issue approvals.

Key functions of the Health, Safety and Permitting Branch include:

- Regulating all mines in B.C. (including metal and coal mines, sand and gravel operations, exploration projects, placer and quarry operations and historical mines as defined under the Mines Act), which comprises:
    - reviewing applications and issuing permits under section 10 of the Mines Act for all exploration mining activities taking place in B.C;
    - conducting regular mine inspections and audits; and
    - enforcing compliance with the Mines Act, the Code and permit conditions.
- Reviewing mine emergency preparedness plans, emergency response plans, and other plans/policies developed by mine operations related to health and safety.
- Establishing geotechnical and reclamation standards.
- Ensuring financial securities adequately consider risks and reflect mine site reclamation liabilities.
- Liaising with mine management, unions and workers, occupational health and safety committees, communities, First Nations and other technical organizations, committees and government agencies.
- Supporting research, development and ongoing training to enhance best practices and promote new knowledge.
- Administering certifications and examinations (e.g., shiftboss, fireboss, mine rescue, blasting, and underground coal mine manager).
- Data collection and maintenance of records with respect to accidents, dangerous occurrences, inspection frequencies and audiometric (hearing test) data.

2 Sector Overview & Administration

2.1 2014 Sector Highlights

According to preliminary estimates from Natural Resources Canada, the production value of B.C. mines fell slightly to $7 billion in 2014 from $7.1 billion in 2013. Estimates generated by the Province's regional geologists indicated that exploration expenditures in British Columbia were $338 million for 2014, down from $476 million for 2013 but still strong in spite of low commodity prices and an economic downturn. Over 30,000 people were employed in mineral exploration, mining and related sectors in 2014.

2.2 Metal and Coal Mine Activities

In 2014, a total of 12 metal mines and 9 coal mines (including Endako, Mount Polley, Brule, Trend, Wolverine, which went into care and maintenance at various times throughout the year) were in production across B.C. The following tables provide information on all of these mines, including estimated production and the number of inspections conducted by MEM staff and contractors at each site in 2014. Inspection figures are generated from MEM's Mine Management System (MMS) and are current as of November 2015. Production figures are based on company reports and/or MEM estimates.

2.2.1 Metal Mines

Mine Name	Company	Nearby Community	Production		# of Inspec-tions
Bonanza Ledge	Barkerville Gold Mines Ltd.	Quesnel	Gold	12,564 oz	3
Bralorne	Bralorne Gold Mines	Lillooet	Gold	3,500 oz	21
Copper Mountain	Copper Mountain Mining	Princeton	Copper	80.9 million lbs	12
			Gold	22,600 oz	
			Silver	443,800 oz	
Endako*	Thompson Creek Metals	Fraser Lake	Molybdenum	8.9 million lbs	11
Gibraltar	Taseko	Williams Lake	Copper	132.4 million lbs	9
			Molybdenum	2.3 million lbs	
Highland Valley Copper	Teck	Logan Lake	Copper	267.9 million lbs	11
			Molybdenum	5.2 million lbs	
Huckleberry	Imperial Metals	Houston	Copper	34 million lbs	13
			Gold	2,702 oz	
			Silver	183,221 oz	
Mount Polley**	Imperial Metals	Likely	Copper	24.5 million lbs	15
			Gold	25,901 oz	
			Silver	74,770 oz	
Mt. Milligan	Thompson Creek Metals	Fort St. James	Copper	64.6 million lbs	11
			Gold	177,600 oz	
Myra Falls	Nyrstar	Campbell River	Zinc	59.5 million lbs	21
			Copper	5.1 million lbs	
			Lead	3.3 million lbs	
			Gold	26,000 oz	
			Silver	1.2 million oz	
New Afton	New Gold	Kamloops	Copper	84.5 million lbs	6
			Gold	104,589 oz	
			Silver	200,000 oz	
Yellow Giant***	Banks Island Gold Ltd.		Gold	13,488 oz	7

*Was shutdown in December 2014 due to low commodity prices
**Was placed in care and maintenance following August 4, 2014 tailings dam breach
***Began production in July 2014

2.2.2 Coal Mines

Mine Name	Company	Nearby Community	Production (tonnes)	# of Inspec-tions
Brule*	Walter Energy	Chetwynd	1.1 million	5
Coal Mountain	Teck	Sparwood	2.5 million	6
Elkview	Teck	Sparwood	6.9 million	6
Fording River	Teck	Elkford	8.1 million	14
Greenhills	Teck	Elkford	5.3 million	9
Line Creek	Teck	Sparwood	3.3 million	10
Quinsam	Quinsam Coal Corp.	Campbell River	296,000	18
Trend**	Peace River Coal (Anglo American)	Tumbler Ridge	1.5 million	14
Wolverine***	Walter Energy	Tumbler Ridge	565,000	5

*Placed in care and maintenance in July 2014
**Placed in care and maintenance in November 2014
***Operations were idled in April 2014 due to low metallurgical coal prices

2.3 Mine Management System (MMS)

The Mine Management System (MMS) allows for the tracking of mine visits and issuances of orders at mines. MMS is a computer-based information management and reporting system that was first launched in 2000, replacing earlier systems used by MEM. Ministry staff use MMS to enter and update data on mine sites, create and store correspondence, generate reports, and monitor reclamation securities. All mine inspections conducted in B.C. are entered into MMS, and inspectors also enter information on reported dangerous occurrences into this database.

Because data in MMS is frequently updated, reports generated from this system are best viewed as a snapshot in time.

2.4 Mine Visits

Mine visits include site visits done by MEM staff and contractors for the purpose of conducting inspections as well as audits, meetings, investigations or training. The information below is current as of November 25, 2015.

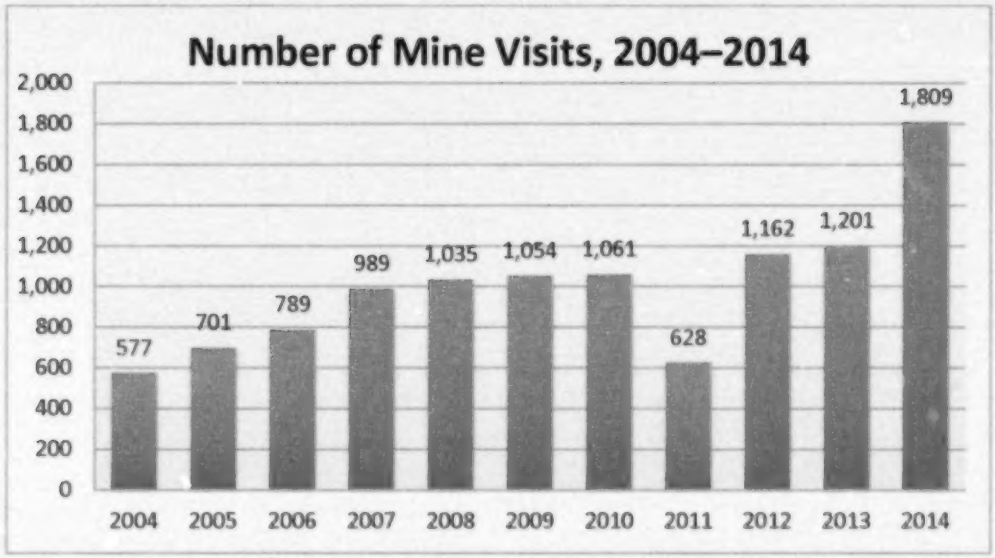

Figure 1: Number of Mine Visits, 2004–2014

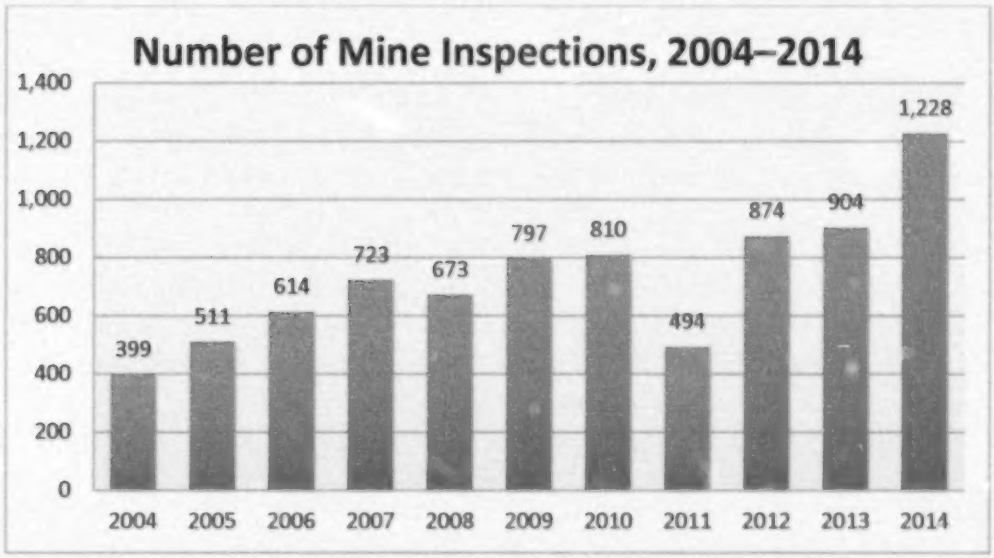

Figure 2: Number of Mine Inspections, 2004–2014

In 2014, Inspectors of Mines made 1,809 visits to mine sites, conducted 1,228 inspections and issued 3,160 health and safety orders. Inspectors also issued 198 environmental orders during the year. The following table provides a summary of MMS data on visits to mines made in 2014 by mine type; this data is from a report generated in MMS on November 25, 2015.

Mine Type	Inspections	H&S Orders	Shutdown Orders	Environmental Orders	Dangerous Occurrences	Investigations	Training	Other
Abandoned	3	0	0	1	0	0	0	0
Custom Mill	5	5	0	2	0	0	0	0
Coal - Surface	86	344	0	5	111	0	6	8
Coal - Underground	19	83	0	0	1	0	0	0
Coal - Exploration	23	73	2	4	2	0	1	0
Exploration - Surface	116	137	3	29	9	1	0	1
Exploration - Underground	26	43	0	18	2	0	0	0
Industrial Minerals - Surface	56	139	0	2	4	1	0	2
Industrial Minerals - Underground	1	0	0	2	0	0	0	0
Metal Leach - Surface	0	0	0	0	0	0	0	0
Metal Mine - Surface	112	384	1	15	44	1	5	1
Metal Mine - Underground	55	208	0	5	12	1	2	5
Placer - Surface	134	80	7	85	1	0	0	1
Placer - Underground	1	0	0	0	0	0	0	0
Rock Quarry	129	387	4	0	1	2	0	3
Sand/Gravel Pit	461	1,277	20	30	2	4	0	11
TOTALS	1,227	3,160	37	198	189	10	14	32

3 Health & Safety

3.1 Occupational Health Section

3.1.1 Roles and Responsibilities

The Occupational Health (OH) Section of MEM assists in the anticipation, recognition, evaluation and control of health hazards. The section provides materials for health and safety education and training, and sets standards for the inspection and enforcement of occupational health issues for mines in British Columbia.

The Health, Safety and Reclamation Code for Mines in British Columbia requires Mine Managers to develop and implement a written occupational hygiene-monitoring program to establish procedures and measure chemical and physical hazards to which their workers are exposed in the workplace. These hazards can include dusts, silica, respirable combustible dust, noise, gases and fumes, radiation (ionizing and non-ionizing) and heat/cold stress. The OH Section makes comparative measurements to ensure companies follow proper procedures and obtain accurate results.

A written preventative training program that educates the mine site's workforce and Occupational Health and Safety Committee members on the recognition, evaluation and prevention of adverse health effects resulting in musculoskeletal disorders is also a requirement of the Code. Such musculoskeletal disorders may consist of lower back injury, repetitive strain, overexertion or vibration-induced injuries. Training must include a practical component that involves identifying and evaluating risks to develop practical solutions. The OH Section assists mines in this training area by providing information and assistance as needed.

Medical Surveillance and Workplace Hazardous Materials Information System (WHMIS) programs are included in the OH Section's responsibilities. OH staff also provide assistance in program development.

3.1.2 Structure and Organization

During 2014, there were three full-time persons one auxiliary and one co-op student in the OH Section:

- Manager, Occupational Health
  - Inspector of Mines, Occupational Health
  - Occupational Health and Safety Advisor
  - Occupational Health Co-op Student
- Inspector of Mines, Ergonomics

3.1.3 Summary of Activities

In 2014, the OH group

- conducted onsite inspections of mines to fulfill its mandate to monitor workplace conditions;
- participated in health and safety audits at mines;
- conducted research toward guidelines on reducing lead exposure in fire assay labs, use of perchloric acids, and storage of flammable and combustible materials;
- conducted research into the Globally Harmonized System (GHS) of Classification and Labelling of Chemicals and its application to the B.C. mining industry with plans to adopt GHS in the future; and
- organized the Mine Safety Awards and Provincial Mine Rescue Competition.

3.2 Mine Health and Safety Auditing Program

The Mine Health and Safety Auditing Program is designed to evaluate mines on their implementation of Health and Safety Management Systems for compliance with key parts of the Code. The audit program reflects the 2008 version of the Code and emphasizes the findings of auditing inspectors. Audit reports summarize the findings of the auditors, who base their conclusions on field observations, interviews with mine management and staff, and research of mine records. Audit reports help mine management and workers improve their health and safety practices and compliance with the Code.

In 2014, audits were conducted at Mount Polley (February 2014), Gibraltar (February 2014) and Mount Milligan (July 2014).

3.3 Competitions and Awards

3.3.1 Roles and Responsibilities

The primary mandate of MEM's Health, Safety and Permitting Branch is to ensure worker health and safety, public safety and reclamation and protection of the land and watercourses affected by mining and exploration in B.C. The Mines Act and the Code specify the legal responsibility of provincial mining companies in meeting this mandate. However, many B.C. mining companies and their individual workers voluntarily and consistently exceed these legal requirements. Through the efforts of these individuals, companies and staff of the Province of British Columbia, mining is one of B.C.'s safest heavy industries.

Mine rescue competitions, first aid competitions and safety awards all promote and encourage safety at B.C. mines. Reclamation awards (see section 4.2.8) acknowledge those companies that go beyond their mine plans by conducting superior research and introducing innovative techniques to restore the land.

3.3.2 Mine Rescue Competitions

The 59th annual Provincial Mine Rescue and First Aid Competition was held on June 7, 2014 in Smithers. The various components of this yearly event are judged by MEM staff and industry personnel who are responsible for all aspects of worker and public safety in B.C.'s mining sector. 2014 competition winners are listed below.

Underground Mine Rescue – Overall Winner

The overall winner of the Underground Mine Rescue trophy in 2014 was the mine rescue team from Myra Falls.

Surface Mine Rescue – Overall Winner

The team from Teck's Elkview Operations won the overall Surface Mine Rescue trophy in 2014.

Surface Bench Competition

The surface bench competition originated in 1995. The Maurice Boisse Memorial Trophy is awarded to the surface mine rescue team that excels at the practical bench competition. The practical bench task is designed to test individual team members on their knowledge and practical skills in mine rescue equipment and techniques. This competition is held in memory of Maurice Boisse, Mine Rescue Team Coach, Island Copper Mine.

In 2014, Elkview Operations' mine rescue team won the award for best bench for a surface team.

Underground Bench Competition

The underground bench competition originated in 1978. This competition is held in memory of the late Barry Abbott, Captain of the Cominco HB mine rescue team, which won the Canadian Championship in 1976.

In 2014, the Barry Abbot Memorial Trophy was won by Myra Falls' mine rescue team.

Obstacle and Recovery

Quinsam Coal mine provides this award in recognition of the contributions made by Keith Bracewell to the underground mine rescue competition. This award recognizes the winning team in obstacle and recovery, the largest task in the underground competition, an area that Keith worked hard to develop and improve upon. The mine rescue team from Myra Falls won the Keith Bracewell Memorial Award in 2014.

3.3.3 First Aid Competitions

There are two separate competitions in the first aid category: the three-person miners' first aid competition and the first aid component of the underground mine rescue competition.

Underground First Aid

This award, known as the Sullivan Cup, was originally introduced by Cominco Ltd. to recognize the best first aid by an underground mine rescue team. In 2014, the Sullivan Cup was presented to the mine rescue team from Myra Falls.

Three-Person Miners' First Aid

The first provincial miners' three-person first aid competition was held in 1978. Following the completion of a short written exam, the three team members perform first aid tasks. The St. John Ambulance standard-level first aid course is the training standard, and only those who work at a mine are permitted to enter this competition. The three-person first aid competition is designed to be an extension of training in basic first aid skills and is a unique way for teams to prepare to assist their fellow workers in the event of an injury or medical emergency.

The 2014 three-person first aid winning team was from the Huckleberry mine, which also won the 2014 Kathy Lofstrom Memorial Trophy for best coach of a first aid team. 2014 was the third year in a row that Huckleberry won these two trophies.

3.3.4 53rd Annual Mine Safety Awards

The 53rd Annual Mine Safety Awards were handed out on March 23, 2015to B.C. mines and quarries that accumulated 15,000 or more worker or contractor hours and had no fatalities between the period of January 1 and December 31, 2014.

Small Underground Mine Safety Award

This award was donated by the West Kootenay Mine and Industrial Safety Association in 1951 to encourage and promote safety in small underground mines. Since 1956, the

competition has been open to qualifying mines throughout B.C. The award is given to the mine having the lowest compensable injury-frequency rate after working between 20,000 and 240,000 hours, one-third of which were underground. The mine must have operated for at least nine months during the calendar year, and a fatality automatically disqualifies a mine for that year. No mines qualified for this award for this award in 2014, as most underground mines in the province compete in the "large" mines category.

Large Underground Mine Safety Award

This award was created in 2010 to recognize safety excellence in B.C.'s large mines with underground workings. The award is given to the mine with the lowest compensable injury-frequency rate with more than 240,000 worker hours, one-third of which were underground. The mine must have operated for at least nine months during the calendar year, and a fatality automatically disqualifies a mine for that year. The 2014 recipient was New Gold Inc.'s New Afton mine.

John Ash Award (Open-Pit Mines and Quarries)

This award is presented to the mine that has worked a minimum of 1,000,000 hours in a year and attained the lowest compensable injury-frequency rate. Taseko Mines Ltd.'s Gibraltar mine received the 2014 John Ash Award.

Edward Prior Award (Open-Pit Mines and Quarries)

This award is presented to operations that logged between 200,000 and 1,000,000 worker hours and had the lowest compensable injury-frequency rate. The 2014 recipients were the Copper Mountain and Endako mines.

Stewart/O'Brian Safety Award (Open-Pit Mines and Quarries)

This award is presented to operations that logged between 35,000 and 200,000 worker hours and had the lowest compensable injury-frequency rate. The 2014 award was shared by five mines:

- Mt. Brussilof (Baymag Inc.)
- Ashcroft Quarry (I.G. Machine & Fibers Ltd.)
- Texada Quarry (Lafarge Canada Inc.)
- Jamieson Quarry (Mainland Sand and Gravel Ltd.)
- Quintette (Teck Coal Ltd.)

3.3.5 Certificates of Achievement & Special Commendations and Awards

Certificates of Achievement

Certificates of Achievement are presented to mines with a minimum of 15,000 worker hours and an injury-frequency ratio of zero. There were a total of seven mines that qualified for certificates for work conducted in 2014:

- Windermere Mining Operation (CertainTeed Gypsum Canada Inc.)
- Sumas Shale Quarry (Fraser Pacific Enterprises Inc.)
- Harper Ranch Quarry (Plateau Construction Ltd.)

Chief Inspector of Mines' Recognition Award

The Chief Inspector of Mines' Recognition Award is a merit-based award intended to recognize mine sites and/or individuals that have accomplished outstanding achievements in or greatly advanced health and safety at B.C. mines. There were no recipients of this award in 2014.

3.3.6 National Safety Awards – John T. Ryan Trophies

John T. Ryan trophies are provided by Mine Safety Appliances Canada Limited as a memorial to the founder of the company. The trophies are awarded by the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) to the metal mine, the coal mine and the select mine which, in the previous year, experienced the lowest reportable injury frequency per 200,000 employee hours in all of Canada. There are two trophy categories: Canada and Regional. Teck's Greenhills Operations was awarded the Canadian national award for the lowest reportable injury frequency in the coal mine category during the 2014 calendar year.

3.4 Examinations and Certifications

Section 26 of the Mines Act states that every person employed at a mine must, if required by the regulations or the Code, be under the daily supervision of a person who holds a valid and appropriate certificate as required by the regulations or the Code. The required certification is specified in Part 1.12 of the Code. Recipients of a valid permanent certificate must complete re-examination every five years to ensure that their knowledge of the Code remains current.

3.4.1 Board of Examiners

The Chief Inspector of Mines chairs the Board of Examiners and appoints other inspectors as members. In 2014, the board was chaired by A. Hoffman, and E. Taje, R. Thorpe, R. Booth and D. Howe sat as members. The board is responsible for:

- examining applicants for First and Second Class Underground Coal Mine Manager, fireboss and shiftboss certificates and certificates of competency;
- issuing certificates;
- conducting reviews of suspended certificates;
- administering blasting certificates; and
- reviewing qualifications and ensuring certification validity among other provinces.

3.4.2 Shiftboss Certificates

The following table summarizes shiftboss certification activity in 2014:

Number Passed	New Certificates
Surface	71
Underground	38
Total Permanent Certificates Issued	**109**

One shiftboss certificate was suspended in 2014.

3.4.3 Total Underground Coal Fireboss Certifications

Five underground coal fireboss certificates were issued in 2014, and none were suspended.

3.4.4 Blasting Certificates

Blasting certification is required under Part 8.2.1 of the Code. Types of blasting certificates include:

- Basic
- Exploration
- Surface
- Underground
- Underground Coal (Shotfirer)
- Electrical
- General (which includes all categories except for Underground Coal)

A total of 188 blasting certificates were issued in 2014, and 3 blasting certificates were suspended.

3.4.5 Mine Rescue Certifications

To qualify for mine rescue certification, mine employees must complete approved training and must pass written exams developed for various types of mining, as per Part 3 of the Code.

The Province is responsible for certifying miners in several categories of mine rescue, as listed below. The following mine rescue certificates were issued in 2014:

Type	Number Issued
Underground mine rescue	36
Surface (open-pit) mine rescue	242
Gravel pit mine rescue	0
Total certificates issued	278

One First Class Certificate of Competency for coal was issued in 2014.

3.5 Accidents and Incidents

3.5.1 Dangerous or Unusual Occurrences

Inspectors of Mines are responsible for determining which incidents should be included in the Mine Management System (MMS). These decisions are influenced by workload and staffing levels. In the past few years, Occupational Health and Safety Committees at the mines have been the primary incident investigators, requiring less involvement from inspectors. There were 191 dangerous occurrences entered into MMS for 2014, compared to 206 dangerous occurrences entered for 2013.

Location of Incident	Number of Incidents Reported	% of Total Incidents Reported
Pit	70	36.6
Plant/Mill	19	9.9
Maintenance (Shop	3	1.6
Maintenance (Field)	9	4.7
Highwall	9	4.7
Dump	12	6.3
Tailings Pond	2	1.0
Office	4	2.1
Dry	1	0.5
Underground General	1	0.5
Underground Face	1	0.5
Underground Outbye/Haulage Drift	0	0

Work Practice Contributing to Incident	Number of Incidents Reported	% of Total Incidents Reported
Equipment Failure	33	17
Inadequate Planning	71	37
Inadequate Management	49	26
Inadequate Equipment	12	6
Poor Work Standards	41	21
Abuse or Misuse	23	12
Training	60	31
Not Following Work Procedures	63	33
Operator Error	71	37

Equipment Involved	Number of Incidents Reported	% of Total Incidents Reported
Haul Truck	27	14.1
Grader	1	0.5
Loader	6	3.1
Shovel	15	7.9
Dozer	18	9.4
Drill, Surface	5	2.6
Drill, Underground	1	0.5
Pickup	13	46.8
LHD	0	0
Conveyer	9	4.7
Electrical	14	7.3
Explosives	9	4.7
Excavator/Backhoe	5	2.6
Crane	3	1.6
Forklift	3	1.6
Water Truck	2	1.0
Scraper	1	0.5
Service Truck	18	9.4

Note: The numbers in the tables shown above are not intended to add up to 100% as there may be several preventative actions, locations, work practices or equipment involved for a single incident.

General Incident Information	Number of Incidents Reported	% of Total Incidents Reported
Number of Persons Involved	169	-
Number of Persons Injured	24	-
Near Miss	84	44
Fire	15	8.0
Geotechnical	5	3.0

3.5.2 Injury Rates for Quarries and Open Pit Coal, Open Pit Metal and Underground Mines

According to WorkSafeBC data, as of December 11, 2015, the 2014 total estimated injury rate (weighted average) at mines in British Columbia was 0.9, representing no change from 2013. The unit for the injury rate statistic is the "number of claims per 100 estimated person-years of employment", where "number of claims" refers to those that received standard, limited or survivor benefits in the year of injury or in the first quarter

of the year following the year of injury. The estimated injury rates are adjusted on an ongoing basis to match claims data.

In 2014, the estimated injury rate for open pit metal mines decreased to 1.0 from 1.3 in 2013. The estimated injury rate for open pit coal mines remained at 0.6. The estimated injury rates at underground mines and quarries increased in 2014, to 1.6 and 4.2 from 0.9 and 3.5, respectively.

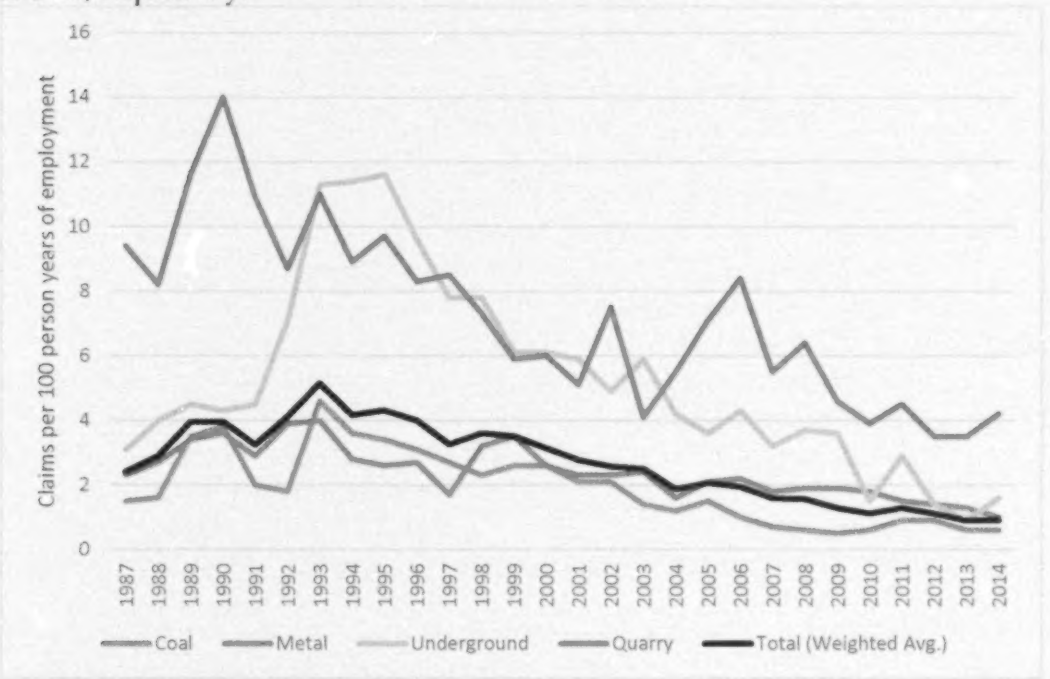

Figure 3: Injury Rates for Quarries, Open Pit Coal, Open Pit Metal, and Underground Mines in British Columbia, 1987–2014

As of December 2015, WorkSafeBC has accepted a total of 139 short-term disability, long-term disability and fatal claims for 2014, down from 148 in 2013. The number of days lost to injury also decreased to 7,933 in 2014 from 10,399 in 2013.

3.5.3 FATALITIES

There were 3 mining-related fatalities in 2014:

- On March 17, 2014, a service worker was fatally injured at Teck's Coal Mountain Operations (located about 30 km southeast of Sparwood) when he was struck by frozen mud, which dropped from the raised box of a haul truck.
- On September 16, 2014, the driver of a welding truck and a passenger were killed at the Swansea Ridge Quarry (located about 16 km south of Cranbrook). As of December 2015, MEM's investigation of this incident is ongoing.

4 Permitting

4.1 Overview

In general, MEM's Regional Offices handle applications under the Mines Act for exploration and small-scale mining activities. These kinds of permit applications are called "Notices of Work" and are reviewed by MEM regional staff and/or regional Mine Development Review Committees.

Proposed major mines, major expansions/upgrades to existing mines, and some large-scale exploration/development projects require approval under the Mines Act as per part 10.1.2 of the Health, Safety and Reclamation Code for Mines in British Columbia. Large-scale mining applications, including major expansions/upgrades to existing major mines, are reviewed by a wide array of staff from the Health, Safety and Permitting Branch and other agencies. MEM's Major Mines Permitting team consists of specialized technical staff from across the province who review applications with regards to health and safety, environmental, electrical, mechanical, geotechnical, and reclamation considerations, among others. In addition to Mines Act permits or permit amendments, various other authorizations are required for major mining projects, and applications are generally reviewed by project-specific Mine Review Committees.

Major mines and expansions also typically require environmental assessment (EA) certificates. The Environmental Assessment Office (EAO) manages the review of proposed major projects in British Columbia, as required by the Environmental Assessment Act. The EA process provides for the thorough, timely and integrated assessment of the potential environmental, economic, social, heritage and health effects that may occur during the lifecycle of these projects, and provides for meaningful participation by First Nations, proponents, the public, local governments, and federal and provincial agencies. Health, Safety and Permitting Branch staff participate in the EA process as working group members and/or technical experts.

4.2 Co-operation and Consultation with First Nations

The Province is legally obligated to consult and, where appropriate, accommodate First Nations on land and resource decisions that could impact Aboriginal interests. The Health, Safety and Permitting Branch works closely with First Nations to inform them of proposed exploration and mining activities and ensure that all concerns are considered. Applications involving mechanical disturbance of the land surface and/or watercourses are referred to First Nations so their interests can be considered.

4.3 Major Mines Permitting

During 2014, a total of 42 Mines Act permits were issued for major mines. This included two new mines, Kitsault and Banks Island Gold, along with a major amendment for the operational phase at the Roman mine. MEM also issued permit amendments allowing for expansions at several major mine operations: Quinsam (7 South Area 5), Elkview (BRX), Greenhills (Cougar Pit), Line Creek (MSX Pit), Mount Polley (Caribou Phase 4 Pit) and increased mill throughput at New Afton. Another major permitting initiative was the amendment of Teck's permits for its five Elk Valley coal mines to incorporate aspects of the Elk Valley Water Quality Plan. Other permit amendments or approvals were issued to Huckleberry, Texada, Willow Creek, Fording River Operations, Sullivan, Coal Mountain, Greenhills and Brule, among other operations, for various projects and plans.

Staff from MEM were involved in the EA reviews of several mine projects in 2014, including the Blackwater, Brucejack, Fording River Swift, Harper Creek and Murray River projects. MEM staff also participated in technical working groups for the Ajax, Baldy Ridge Extension, Burnco, Coal Mountain Phase 2, Crown Mountain, Giscome, Kemess Underground, Raven, Ruddock Creek and Sukunka projects.

4.4 Notices of Work (NoWs)

The following data on Notice of Work (NoW) permit applications was entered into MMS for 2014:

Type	Notice of Work Applications Received	Notice of Work Applications Processed*	Average # of Days To Process
Mineral/Coal (Exploration)	300	272	31
Mineral/Coal (other)	19	12	44
Placer	310	302	55
Sand & Gravel/Quarry	208	182	50
Total	837	768	41

* Applications that were approved or rejected.

The table below presents a regional breakdown of the 2014 NoW data:

Region	Placer	Sand & Gravel/ Quarry	Mineral & Coal	Total
Central/Northeast	57	62	78	197
Northwest	57	53	81	191
South Central	154	37	71	262
Southeast	30	17	76	123
Southwest	12	39	13	64
Total	310	208	319	837

The chart below presents a monthly breakdown of the 2014 NoW data:

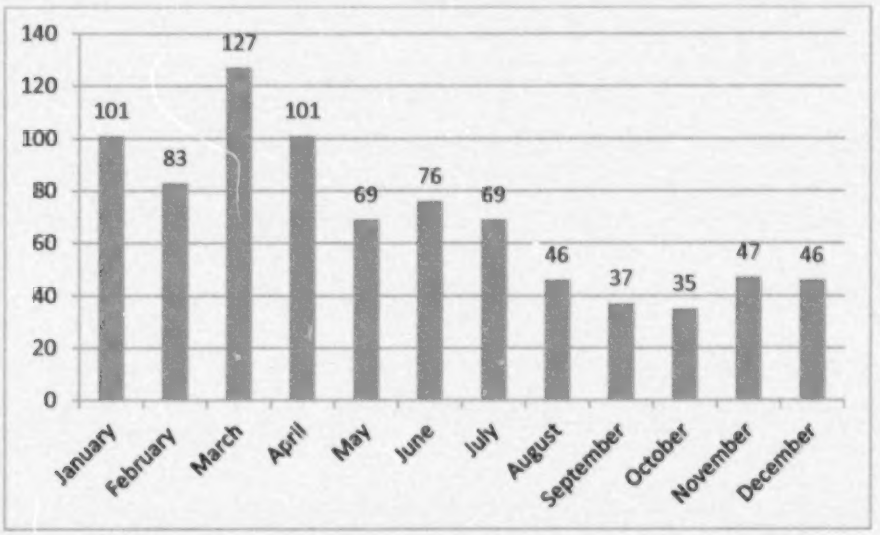

Figure 4: 2014 Notices of Work by Month

The areas covered by the regions are:

- Central/Northeast = Prince George, Omineca, Horsefly and Valemont
- Northwest = Smithers and Skeena
- South Central = Kamloops, Okanagan and Thompson
- Southeast = Cranbrook, Fernie and Elk Valley (Kootenay)
- Southwest = Lower Mainland, Vancouver Island, South Coast and Haida Gwaii

5 Mechanical, Electrical & Geotechnical

5.1 Mechanical and Electrical Engineering

5.1.1 Roles and Responsibilities

Mechanical and electrical inspectors ensure that all mechanical and electrical equipment installed and used at mines in B.C. complies with the Mines Act and applicable codes and standards, and that this equipment is maintained and operated appropriately so that it causes no hazard to people or property.

5.1.2 Structure and Organization

There is a Senior Inspector of Mines, Mechanical, based in Prince George and an Inspector of Mines, Mechanical, based in Smithers, there is a Senior Inspector of Mines, Mechanical (auxiliary) based in Kamloops. There is also a Senior Inspector of Mines, Electrical and an Inspector of Mines, Electrical, based in Kamloops.

5.1.3 Summary of Activities

In 2014, there was a significant demand on the Mechanical and Electrical Engineering Section to keep up with the design, approval and construction plans of new mines. The section also participated in or provided input for several audits in 2014 and assisted with the Provincial Mine Rescue and First Aid Competition. In addition, Mechanical and Electrical Engineering Section staff conducted numerous mine site inspections and attended meetings around the province.

During the 2014 calendar year, mechanical and electrical inspections were conducted at major mines and large sand and gravel operations across the province, as well as at some smaller sand and gravel/quarry operations. Several new operations required extra inspections and reviews of engineering specifications and drawings, and a number of new projects were reviewed for compliance. All of these operations required considerable time for the review of their new equipment and installations to ensure compliance with the necessary B.C. and Canadian code requirements.

In 2014, MEM's mechanical inspectors reviewed submissions of data to ensure compliance with code requirements for several new models of mobile equipment proposed to enter service in British Columbia, reviewed submissions for mining infrastructure for new and existing mines. The Senior Inspector of Mines, Mechanical is a member of the review committee for CSA Standard G-4 (Wire Ropes), CSA Standard CSA M-422 (Fire Performance and Antistatic Requirements for Conveyor Belting), CSA Standard Z-150 (Safety Code on Mobile Cranes) and CSA Standard Z-150.3 (Safety Code

on Articulated Cranes), and participated in the CSA Mine Advisory Panel (steering group for mining Standards development).

The Senior Inspector of Mines, Electrical is a member of the review committee for CSA Standard M421-11 (Use of Electricity in Mines).

5.2 Geotechnical

5.2.1 Roles and Responsibilities

The Geotechnical Section is responsible for completing inspections at operating and closed mines with the focus on performance of tailings dams, waste rock dumps, open pit slopes, and underground openings. Mining projects are reviewed for the health and safety of the public and mine workers, as well as protection of the environment.

The Geotechnical Section provides technical review of proposed mining projects seeking approval under the Mines Act and the B.C. Environmental Assessment Act. The section also reviews geotechnical incidents and responds to mine enquiries.

The Geotechnical Section provides geotechnical advice and policy development for:

- tailings impoundments and dams;
- waste rock and overburden dumps;
- open pits and underground developments;
- mine roads;
- risk evaluation for worker protection and public health and safety; and
- assessing the environmental impact of geotechnical projects.

5.2.2 Summary of Activities

In 2014, the Geotechnical Section (three MEM staff, three contractors, and a consulting firm):

- conducted 38 geotechnical inspections (compared to 31 in 2013);
- developed geotechnical permit conditions for the construction and operation of major mine structures, including tailings impoundments, pit walls, and waste rock dumps;
- undertook environmental assessment reviews for new mine projects; and
- reviewed annual reports for tailings storage facilities, waste rock dumps and pit walls.

In 2014, a total of 38 geotechnical inspections were conducted by MEM staff and contractors. Of these inspections, 8 took place at operating metal mines, 7 took place at

operating coal mines, and the remainder took place at other sites, including several previously operating mines.

5.2.3 Mount Polley Breach

The Mount Polley mine is located approximately 65 kilometres northeast of Williams Lake, near the community of Likely. It is an open pit copper-gold mine with a small underground working and is owned by Mount Polley Mining Corporation, a subsidiary of Imperial Metals Corporation.

In the early morning hours of August 4, 2014, Mount Polley's tailings storage facility breached, causing over 21 cubic million metres of tailings and water to release to the environment. Shortly afterwards, three separate investigations into this incident were launched. An independent expert engineering panel was established to determine the root cause of the breach, and the Chief Inspector of Mines and British Columbia Conservation Officer Service began conducting investigations which will determine if charges will be laid for contraventions under the Mines Act or the Environmental Management Act.

Above: Aerial photo of the Mount Polley tailings storage facility breach

The Chief Inspector launched an independent comprehensive investigation pursuant to Section 7 of the Mines Act with the objectives to determine:

- the root and contributory causes of the dam breach;
- any contraventions of
  - requirements of the Mines Act or regulation,
  - the Health, Safety and Reclamation Code for Mines in British Columbia,
  - Mount Polley's Mines Act permit and/or the Health Safety and Reclamation Code, and/or
  - orders pursuant to the Mines Act, if appropriate;
- recommendations to prevent reoccurrence;
- whether or not to, based on the findings, consider making a report to Crown Counsel for the Crown's assessment of whether charges should be laid.

The Chief Inspector's investigation was ongoing through the end of 2014.

In response to the Mount Polley breach, on August 18, 2014, the Chief Inspector of Mines issued an order to have mining companies complete and submit a Dam Safety Inspection for every tailings storage facility at a permitted mine at an accelerated deadline of December 1, 2014.

For more information on the Mount Polley breach, please visit www.gov.bc.ca/mountpolley.

6 Reclamation

6.1 Roles and Responsibilities

Reclamation and environmental protection are major components of all mineral exploration and mine development activities in British Columbia. Since 1969, companies have been required by law to reclaim all lands disturbed by mining and related activities. B.C. was one of the first provinces in Canada to enact mine reclamation legislation, and the first to extend this policy to exploration sites.

MEM's Reclamation Section enforces the reclamation provisions of the Mines Act and the Code through permit conditions and detailed technical reviews aimed at finding environmentally sound, economically viable solutions that enable British Columbia's mining industry to remain internationally competitive without compromising this province's rigourous environmental standards.

Prior to starting work, mining companies are required to obtain a permit approving the mine plan, a program for protection of the land and watercourses, and a reclamation program. Mining companies must also place a security deposit with the Province to ensure reclamation obligations are kept.

The environmental protection and reclamation objectives of the Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia ensure:

- land and watercourses on mine sites in B.C. are reclaimed to a level equal to that which existed prior to mining;
- disturbed lands and watercourses are re-integrated into the surrounding landscape;
- long-term stability of structures (i.e., tailings storage facilities); and
- mining and mitigation requirements associated with metal leaching and acid rock drainage (ML/ARD) are conducted in a manner that prevents significant impacts to downstream or onsite biota to minimize reduction in post-mining productive capacity of the site.

To achieve these objectives, the Reclamation Section:

- conducts detailed technical reviews of new projects and proposed project revisions under the Environmental Assessment Act;
- conducts detailed technical reviews and issues permits for operating and closed mines with outstanding reclamation responsibilities under Section 10 of the Mines Act;
- inspects mine reclamation activity;

- administers reclamation security deposits on behalf of the Province of British Columbia;
- participates in national and international committees conducting research and technology transfer, including the national Mine Environment Neutral Drainage (MEND) Committee and the National Orphaned and Abandoned Mines Initiative (NOAMI) committee; and
- organizes and participates in various provincial committees and activities that review and highlight best practices and facilitate government co-operation with industrial, public and academic institutions (examples include the Technical and Research Committee on Reclamation, the Annual Mine Reclamation Symposium, and the Annual ML/ARD Workshop).

Additionally, Reclamation Section staff provide information and assistance on a regular basis to the Ministry of Environment, Ministry of Transportation and Infrastructure, Ministry of Forests, Lands and Natural Resources, Environment Canada, First Nations and the public on technical issues involving reclamation. Collaboration facilitated by MEM staff between industry, the public, government and the academic community continues to result in a constructive climate for exchanging and disseminating new ideas and technologies.

6.2 Structure and Organization

The Reclamation Section has expertise in the technical areas of soil restoration, re-vegetation, land capability, erosion control, geology, geochemistry and ML/ARD. Technical assistance for biological and effluent discharge and offsite requirements is provided by other areas of government (e.g., the Ministry of Environment).

6.3 Summary of Activities

6.3.1 Metal Leaching and Acid Rock Drainage (ML/ARD)

A provincial ML/ARD policy, a more detailed set of ML/ARD guidelines, and a manual of recommended methods for the prediction of ML/ARD indicate what constitutes acceptable mine design and adequate technical evidence. These documents provide a checklist for industry and inform the public of regulatory conditions and environmental-protection requirements.

6.3.2 Reclamation Securities and Funds

All mines operating in B.C. must deposit securities with the government to ensure that reclamation costs do not fall on provincial taxpayers (e.g., if a mining company goes bankrupt). In the past few years, the value of security deposits has increased to reflect

more closely the true costs of reclamation. The total value of securities held by the Province has risen from $10 million in 1984 to more than $773 million by the end of 2014.

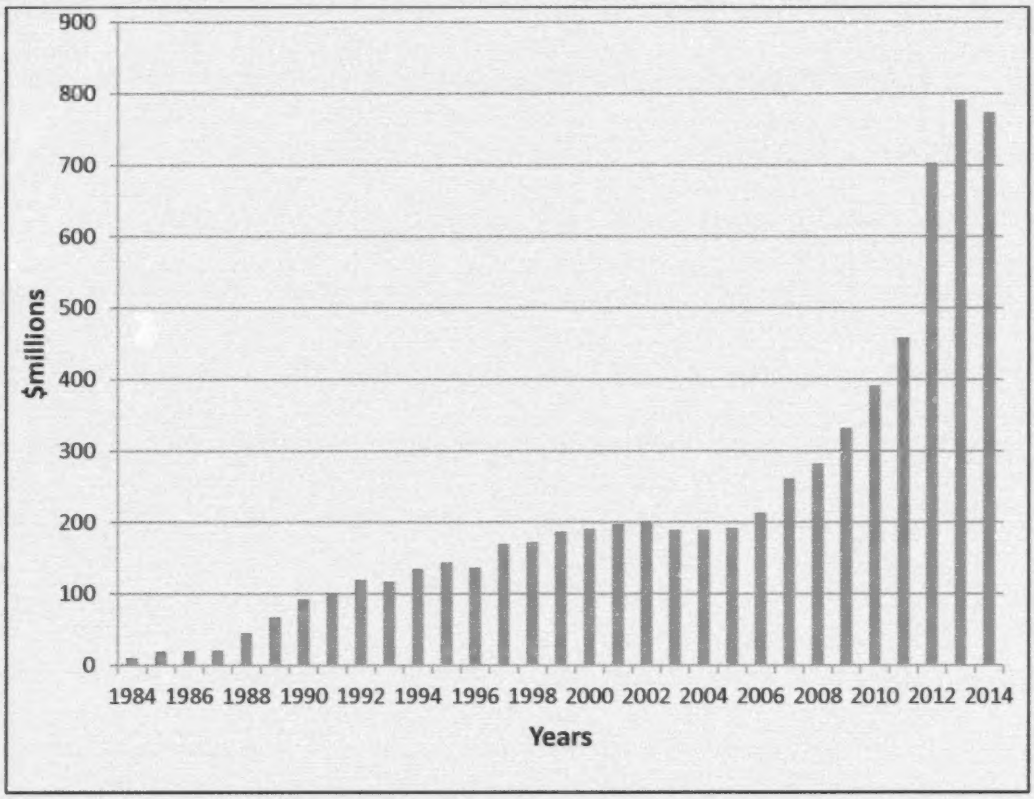

Figure 5: Reclamation Security Deposits Held by the Province (Initiation to 2014)

6.3.3 Technical and Research Committee on Reclamation

The Technical and Research Committee on Reclamation has been actively promoting and fostering reclamation research and information exchange for more than three decades. Members come from the Ministry of Energy and Mines, the Ministry of Environment, mining companies, the Mining Association of British Columbia, Association for Mineral Exploration in BC, Natural Resources Canada, the University of British Columbia and Thompson Rivers University. This committee has been responsible for the organization of the annual B.C. Mine Reclamation Symposium since 1977.

6.3.4 National Orphaned/Abandoned Mine Initiative (NOAMI)

The National Orphaned/Abandoned Mines Advisory Committee was formed in March 2002 at the request of Canadian Mines Ministers. The Advisory Committee was asked to

study the issue of orphaned/abandoned mines and to develop initiatives and partnerships to implement remediation programs across Canada.

The Advisory Committee takes direction from Mines Ministers and reports back to them through the Intergovernmental Working Group on the Mineral Industry. The Advisory Committee is made up of representatives of federal/provincial/territorial governments, the Canadian mining industry, environmental non-governmental organizations and Aboriginal peoples and their communities. Committee members are responsible for communication with their constituencies. The Ministry represents the Province of British Columbia on this Advisory Committee.

6.3.5 Mine Reclamation Symposium

The 38th Annual Mine Reclamation Symposium was held in Prince George September 22–25, 2013. The four-day event included field trips to the past-operating Kemess and Pinchi mines, a full-day workshop on Design of Mine-Waste Cover Systems, and presentations of 27 technical papers. Attendance was excellent with 219 delegates, 17 sponsored First Nations participants, 18 secondary-school students and post-secondary student helpers.

6.3.6 The Annual British Columbia Mine Reclamation Awards

The annual reclamation awards were not presented this year due to a lack of nominations in the various categories.

6.3.7 Metal Leaching and Acid Rock Drainage Workshop

The 21st annual Metal Leaching and Acid Rock Drainage Workshop was held in Vancouver December 3–4, 2013. The theme of the workshop was "Challenges and Best Practices in Metal Leaching and Acid Rock Drainage". The workshop was organized by the Ministry of Energy and Mines, Natural Resources Canada and the Mine Environment Neutral Drainage (MEND) program in association with the B.C. Technical and Research Committee on Reclamation.

6.4 Industry Reclamation Record

British Columbia's land base is roughly 95 million hectares, and while land occupied by the mining industry has steadily grown since the late 1960s, mining has touched less than one per cent of the province. Major coal and metal mines, which occupied less than 1,000 hectares in 1969, had, by the end of 2014, expanded to cover 49,164.59 hectares. Reclamation (where revegetation has been successfully established for one year or more) has occurred on 36 per cent of this disturbed land, or 17,810 hectares (Figure 6).

Metal mines have disturbed 25,578.49 hectares, and 9,984.43 hectares (or 39 per cent) of this land have been reclaimed (Figure 7). Coal mines have disturbed 23,586.1 hectares, and 7,825.6 hectares (or 33 per cent) have been reclaimed (Figure 8). The increase in disturbance and decrease in reclamation at mine sites in the last few years is the result of the current pace of construction and development of new mines and the expansion and redevelopment at older mines.

The data presented in Figures 6, 7 and 8 demonstrates the expansion of the mining industry in B.C. during the past four decades.

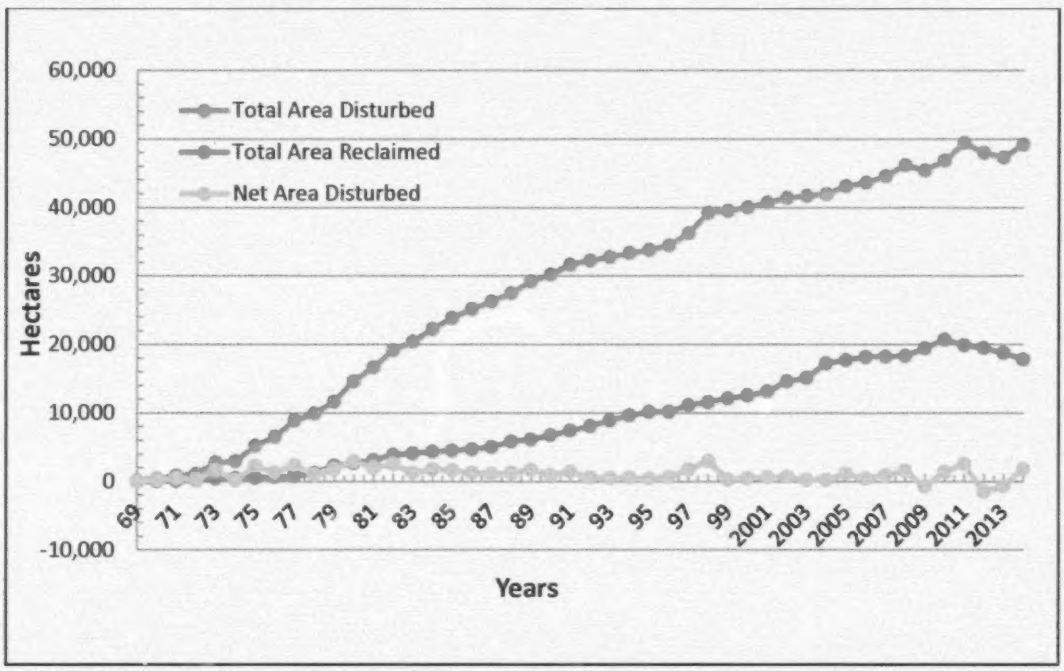

Figure 6: Area Disturbed and Reclaimed by Metal and Coal Mines in B.C. (1969–2014)

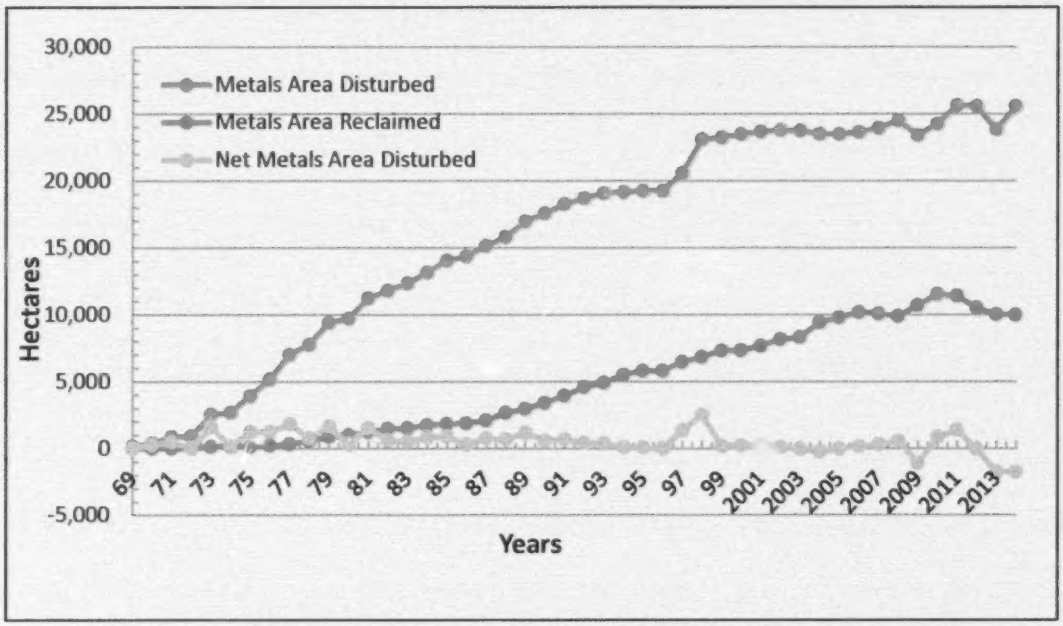

Figure 7: Area Disturbed and Reclaimed by Metal Mines in B.C. (1969–2014)

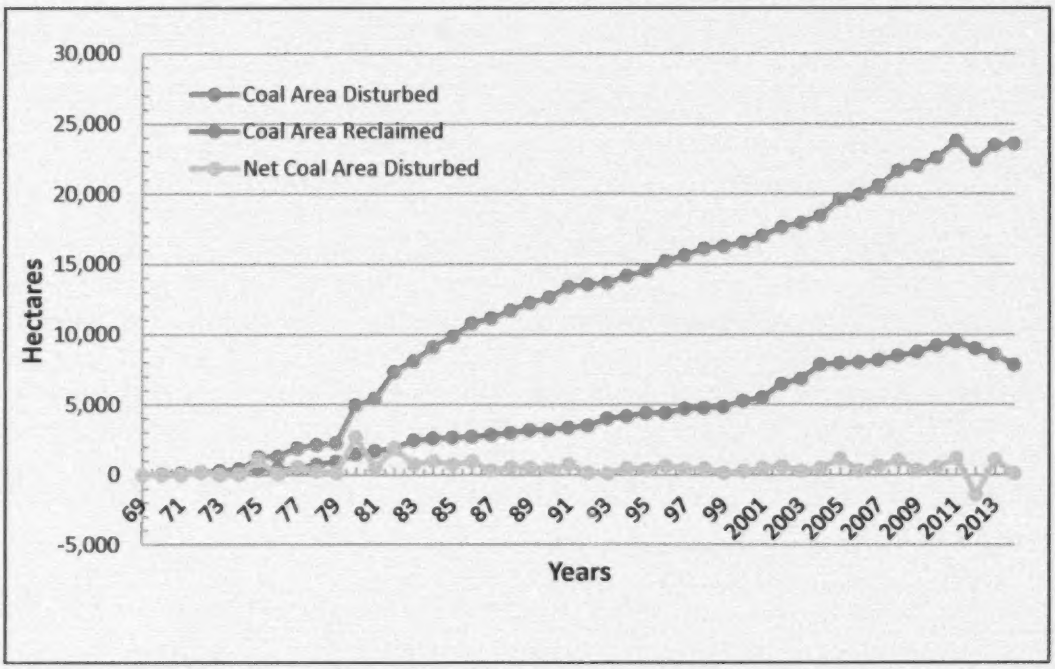

Figure 8: Area Disturbed and Reclaimed by Coal Mines in B.C. (1969–2014)